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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/816,170 | 04/02/2004 | Heine Melle Mulder | 081468-0309024 | 7878 |

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PILLSBURY WINTHROP SHAW PITTMAN, LLP
P.O. BOX 10500
MCLEAN, VA 22102

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| EXAMINER |
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GUTIERREZ, KEVIN C

| ART UNIT | PAPER NUMBER |
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| 2851 | |

| MAIL DATE | DELIVERY MODE |
|------------|---------------|
| 05/25/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/816,170

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| Applicant(s) | |
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MULDER ET AL.

Examiner

Kevin Gutierrez

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| Art Unit |
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2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 May 2007.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 16-20 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 16-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Remarks, filed May 15, 2007, with respect to the rejection(s) of claim(s) 1-13 and 16-20 under 35 USC 102 and 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

DETAILED ACTION

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-10, 13 and 16-20 rejected under 35 U.S.C. 103(a) as being obvious over Mulder et al. (US 2003/0038225) in view of Foo (6,231,198).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Regarding claims 1, 4, and 13, Mulder et al. disclose a divergence optics (fig. 3, 32) disposed along an optical axis (fig. 3, center line impinging 33c) of the lithographic apparatus,

an optical element (33; array), located downstream from the divergence optics (32), constructed and arranged to redistribute an intensity distribution exiting the divergence optics (32) such that the intensity distribution is asymmetric with respect to at least one of the X and Y axes ([0078], lines 23-26; fig. 5, where the circular areas represent an increase intensity profile, which is asymmetric with respect to a 2-d cross-sectional axis).

Mulder et al. does not disclose a reflective integrator having a rectangular cross-section perpendicular to said optical axis, the cross-section having sides parallel to mutually perpendicular X and Y axes and arranged for the beam of radiation to exit from said reflective integrator to the optical element and “wherein said optical element is disposed downstream of said reflective integrator in a pupil plane of said illumination system.”

However, Foo teaches a reflective integrator (500; parabolic fly-eye array) having a rectangular cross-section perpendicular to said optical axis (518; axis), the cross-section having sides parallel to mutually perpendicular X and Y axes (col. 8, lines 49-50, where the array is two-dimensional) and arranged for projection in an illumination system (col. 2, lines 37-39). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to modify the divergence optics of Mulder et al. by replacing it with the reflective optical integrator

of Foo utilized as a beam of radiation exiting the optical integrator to impinge the optical element located downstream in a manner described above for at least the purpose to provide a uniform collimated and aberration beam as suggested by Foo (col. 8, lines 27-30).

Regarding claims 2-3 and 17, Mulder et al. further disclose wherein said optical element (33) is constructed and arranged to rotate an intensity distribution of a beam of radiation around said optical axis over an angle between 5 and 85 degrees” and “wherein said angle is $90/n$ degrees where n is an integer number in a range from 2 to 18 (see fig. 3, where reflected beam off of array 33 are rotated in different angles and any desired spatial/angular redistribution can be achieved; [0097], lines 20-23).”

Regarding claim 5, Mulder et al. further disclose “wherein said optical element (33) includes at least one pair of reflective surfaces (33a-33e; reflective elements), said pair of reflective surfaces (33a-33e) constructed and arranged to reallocate part of the intensity distribution of said beam ([0078], lines 23-26).”

Regarding claim 6, Mulder et al. further disclose “wherein a distance between the optical axis (fig. 3 line impinging 33c) and said part of the intensity distribution upstream of said optical element (33) is equal to said distance downstream of said optical element (see fig. 3, where light rays upstream and downstream from the array 33 are equal).”

Regarding claim 7, Mulder et al. further “wherein said reflective surfaces (33a-33e) include coated mirrors ([0077], lines 1-3, where reflective surfaces are mirrors, which inherently are coated for reflection).”

Regarding claim 8, Mulder et al. further disclose “wherein said at least one pair of reflective surfaces (33a-33e) are planar and parallel to each other ([0076], lines 2-5 and lines 14-16, the orientation of the reflective elements 33a-33e are adjustable to be set in planar and parallel to each other) so that a direction of a ray of said beam of radiation upstream of said optical element (33) equals a direction of said ray downstream of said optical element (see fig. 3, where light rays upstream and downstream are equal).”

Regarding claims 9-10 and 19-20, Mulder et al. further disclose “wherein the optical element includes two pairs of reflective surfaces (33a-33e), each pair of reflective surfaces constructed and arranged to reallocate one of two respective poles of said intensity distribution” and “wherein said optical element includes a plurality of pairs of reflective surfaces (33a-33e) constructed and arranged to rotate substantially a whole intensity distribution of said beam of radiation ([0076], lines 14-16; [0078], lines 23-30).”

Regarding claim 16, Mulder et al. further disclose the limitations set forth in claim 1 and further disclose “an illumination system (IL) for providing a projection beam of radiation (PB);

a support structure (MT) for supporting a patterning device (MA), the patterning device serving to impart the projection beam with a pattern of its cross-section;

a substrate table (WT) for holding a substrate (W);

a projection system (PL) for projecting the patterned beam onto a target portion of the substrate (W);

Regarding claim 18, Mulder et al. as modified further disclose the limitations set forth in claims 4-5.

4. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulder et al. in view Foo, as applied to claim 5 above, and in further view of Wynne Willson et al. (6,102,554).

Regarding claim 11, Mulder et al. disclose a plurality of pairs of reflective surfaces (33a-33e), but does not disclose “wherein said plurality of pairs of reflective surfaces includes radially extending and tilted mirror blades, the minor blades including a reflective coating at both sides.”

However, Wynne Willson et al. further disclose “wherein said plurality of pairs of reflective surfaces (col. 4, line 22) includes radially extending (see fig. 1A, where the blades 10 extend in the radial direction) and tilted mirror blades (col. 5, lines 47-51, where light is reflected at an angle), the minor blades including a reflective coating at both sides (col. 4, line 22).” Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to further modify the reflective surfaces of Mulder et al. as modified by utilizing radially extending and coated mirrors in a manner described above for at least the purpose to modify the radiation beam.

Regarding claim 12, Mulder et al. as modified disclose the claimed invention except for “wherein a thickness of said mirror blades varies as a function of distance from the optical axis and as a function of angle around the optical axis.”

However, Wyne Willson et al. further disclose “wherein a thickness of said mirror blades varies as a function of distance from the optical axis and as a function of angle around the optical axis (col. 6, lines 24-26).” Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to further modify Mulder et al. as modified by having a thickness in a manner described above for at least the purpose to modify the exposure beam.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Gutierrez whose telephone number is (571)-272-5922. The examiner can normally be reached on Monday-Friday: 8:00 a.m. - 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on (571)-272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

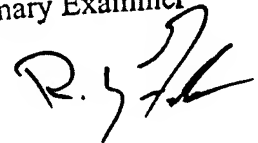
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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin Gutierrez
Examiner
Art Unit 2851

May 22, 2007

Rodney Fuller
Primary Examiner

A handwritten signature in black ink, appearing to read "R. Fuller", is written over the printed name and title of the Primary Examiner.